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(71) Applicant : UNILEVER PLC
Unilever House Blackfriars
London EC4P 4BQ (GB)

(84) GB IE

(71) Applicant : UNILEVER N.V.
Weena 455
NL-3013 AL Rotterdam (NL)

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(72) Inventor : Shana'a, May
17 Gardens Road, Bebington
Wirral L63 7QZ (GB)
Inventor : Steer, David Charles
"Thornwood", Tower Road North, Heswall
Wirral L60 6RS (GB)

(74) Representative : Ford, Michael Frederick et al
MEWBURN ELLIS 2 Cursitor Street
London EC4A 1BQ (GB)

(54) Cosmetic composition.

(57) A liquid, aqueous shampoo composition, e.g. a hair or body shampoo, comprises :
(a) as a principal surfactant component, at least one alkyl polyglycoside ; and
(b) at least one short chain fatty acid soap having a carbon chain length of up to C₁₆, preferably C₈ to C₁₂.

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The present invention relates to cosmetic compositions and in particular to liquid, aqueous shampoo compositions containing a combination of surfactants for use on the body or the hair.

Shampoo compositions may be formulated to select those components, especially surfactant ingredients, which together result in compositions which possess one or more, preferably a combination, of the following beneficial properties:

- 5 (a) the shampoo compositions are stable; that is, the components of the composition do not suffer from chemical instability (decomposition) and/or physical instability (sedimentation/creaming/setting), and in particular the components of a shampoo composition should not be incompatible with each other;
- 10 (b) the shampoo compositions possess adequate foaming capacity, especially the ability to generate foam quickly, easily and foam which is rich and creamy;
- 15 (c) in the case of hair shampoos, the compositions are capable of providing one or more conditioning benefits such as smoothness, softness, gloss, anti-static properties and ease of combing thereof, or at least do not negatively affect such attributes;
- (d) in the case of body shampoos in particular, but also in the case of shampoos for the hair, the compositions are mild to the skin and do not promote dryness or flakiness thereof;
- 15 (e) the shampoo compositions look attractive, and for example may be optically clear or translucent;
- (f) the components of the composition should be derived from natural sources and be readily biodegradable, thereby rendering the product "environmentally friendly".

Alkyl polyglycosides (APG's) are known for inclusion in body and hair shampoo compositions and have the advantages that they are mild surface active agents, biodegradable and obtainable from renewable raw materials. However, APG's give only moderate foam volumes and the foam is slow to generate. The foam quality is also poor, due to lack of richness/creaminess, and frequently sensory properties such as smoothness and gloss of hair and skin treated with APG's are inferior.

GB-A-2139243 describes the use of APG's in conjunction with anionic polymers where it is alleged that the anionic polymer function is to improve the detergency of the APG's and mildness of their foam.

GB-A-976088 describes APG's per se and mentions their incorporation into soap bars for the purpose of enhancing the dispersibility of the soap, as well as for increasing the detergency and biodegradability of the soap product.

EP-A-0070074 and EP-A-0070075 disclose foaming compositions comprising a mixture of surfactants, including an APG and an anionic cosurfactant among which soaps are mentioned.

EP-A-0463912 describes toilet soap bars containing APG to achieve improved foaming, lather, skin feel and moisturisation, lime dispersion and cleaning.

US-A-4396520 describes solid detergent granules comprising APG, calcium-sensitive anionic detergent, e.g. soap, and preferably a detergent builder.

We have now surprisingly found that in the context of aqueous hair and skin shampoo compositions comprising an APG as the principal surfactant component, by incorporation also of a particular kind of fatty acid soap having a short carbon chain length, preferably at a low level relative to the APG, it is possible to produce a shampoo composition having significantly improved foaming characteristics, whilst retaining an overall better balance of other properties, in particular mildness to skin and hair and also beneficial sensory properties such as smoothness and, in the case of hair, other conditioning attributes. This overall optimized balance of foaming and other properties has hitherto not been achieved or even addressed in the prior art referred to above.

Accordingly, in one aspect the present invention provides a liquid, aqueous shampoo composition, for example a hair shampoo, body shampoo, shower gel or the like, comprising:

- 45 (a) as a principal surfactant component, at least one alkyl polyglycoside; and
 - (b) at least one short chain fatty acid soap having a carbon chain length of up to about C₁₆.
- The invention, and in particular preferred embodiments and aspects thereof, will now be described in detail.

Alkyl polyglycoside

50 The alkyl polyglycoside (APG) may be any APG which is capable of being employed in cosmetic compositions. Typically, the APG is one which comprises an alkyl group connected (optionally via a bridging group) to a block of one or more glycosyl groups. Preferred APG's are described by the following formula:



wherein R is a branched or straight chain alkyl group which may be saturated or unsaturated and G is a saccharide group.

R may represent a mean alkyl chain length of from about C₆ to about C₂₀. Preferably, R represents a mean alkyl chain length of from about C₉ to about C₁₂. Most preferably the value of R lies between about 9.5 and about 10.5. G may be selected from C₅ or C₆ monosaccharide residues or mixtures of C₅ and C₆ monosac-

charide residues, and is preferably a glucoside. G may be selected from the group comprising glucose, xylose, lactose, fructose, mannose and derivatives thereof. Preferably G is glucose.

The degree of polymerisation, n, may have a value of from about 1 to about 10 or more. Preferably, the value of n lies in the range of from about 1.1 to about 2. More preferably the value of n is up to about 1.5. Most preferably the value of n lies in the range of from about 1.3 to about 1.5.

Preferred APG's for use in the invention are those which contain no or substantially no alkoxylate groups in the chain, as the presence of such groups renders the APG less readily biodegradable.

Suitable alkyl polyglycosides for use in the invention are commercially available and include for example those materials identified as: Oramix NS10 ex Seppic; and APG225, APG300 (corresponding to the material sold as PLANTAREN 2000), APG350, APG550 and APG600 (alternatively known as PLANTAREN 1200) ex Henkel.

The level of APG as the principal surfactant component in the shampoo compositions of the invention is preferably from about 1 to about 40% wt, more preferably from about 5 to about 30% wt, most preferably from about 10 to about 20% wt.

Short chain soap

The short chain soap may be any short chain soap which enhances the foam volume, speed of lathering and/or foam quality of the APG. Preferred short chain soaps are those which are soluble in the shampoo composition.

The short chain soap is a soap which has a carbon chain length of up to about C₁₆, more preferably up to about C₁₂ or C₁₄. The short chain soap may be a linear or branched chain soap and may be saturated or unsaturated. Most preferably the short chain soap is a saturated, linear short chain soap.

The most preferred short chain soap length, particularly for compositions for use on the hair, is from about C₈ to about C₁₂ or C₁₄, especially C₈ to C₁₀ or C₁₂. Suitable short chain length soaps for use in the present invention include those of caprylic, capric, myristic and lauric acids and mixtures thereof.

C₈ to C₁₀ soaps are especially good, e.g. compared with C₁₂ to C₁₆ soaps, for giving enhanced foam volume as well as density and also, in the context of hair shampoos, for avoiding negative effects on attributes such as gloss.

In general we have found that shorter chain length soaps are preferable over longer chain length soaps in terms of an overall enhanced foaming, measured for example by parameters such as rate of generation of foam, amount and creaminess of foam (both visual and tactile perceptions), ease of rinse, slipperiness of foam covered and rinsed hair, coarse/dry feel and ease of wet combing.

The amount of short chain soap present in the shampoo compositions of the invention may be selected so as to give the desired degree of foam quality/quantity enhancement. Preferably the short chain soap is present in an amount of from about 1 to about 20% wt, more preferably from about 1 to about 12% wt, even more preferably from about 2 to about 6% wt.

In preferred embodiments, in the compositions of the invention the short chain soap is present in a relatively low amount compared with the APG, such that the soap:APG weight ratio is preferably less than about 1:1, especially less than about 1:2. An optimum weight ratio is preferably from about 1:2 to about 1:20 or possibly less, more preferably from about 1:3 to 1:10. Generally enough of the soap component should be present in order to achieve, in conjunction with the APG surfactant component, the beneficial combination of properties characteristic of the compositions of the invention.

Other ingredients

Other components which may or may not be present in compositions of the instant invention include thickeners, for example naturally occurring polysaccharides or derivatives thereof such as starch, xanthan gums, carrageenan gum and the like, alginates such as sodium alginate, naturally occurring soluble starches, synthetic polymers, e.g. cellulose gums and other cellulose derivatives such as hydroxypropyl cellulose, polyacrylates, either in combination with naturally occurring soluble viscosity agents or alone, clays and salts such as sodium chloride, ammonium chloride.

Suitable viscosity agents may be present in a range of from about 0.01% by weight to about 4% by weight. Preferably, a viscosity agent, if present, makes up from about 0.2% by weight to about 1% by weight of the compositions.

Other optional components of the compositions of the present invention include waxes such as castor wax, candelilla wax, carnauba wax and beeswax, monoglycerides, sucrose esters, sorbitan esters and the like.

A further optional component of the compositions in accordance with the invention is a cationic condition-

ing polymer, e.g. a cationic derivative of guar gum. Suitable cationic guar gum derivatives are those given the CTFA designation guar hydroxypropyl trimonium chloride, available commercially for example as JAGUAR C13S. Other suitable derivatives include those designated JAGUAR C15, C17, C16, and 162. The cationic polymer may be present in an amount of from about 0.05% to about 0.5% by weight.

5 Further optional components of the compositions of the present invention include one or more additional surfactants for example selected from anionic, nonionic, amphoteric and zwitterionic surfactants, conditioning agents, buffering agents, oils such as those derived from plants or other natural sources, e.g. clove oil, and other components commonly employed in shampoo compositions, such as perfumes, colourings, emollients, suspending agents, stabilisers, opacifiers, pearlisers, preservatives and buffering agents.

10 In general, it is preferred that any optional components present in the compositions of the invention do not adversely affect the naturally derived nature, biodegradability and beneficial range of physical and sensory properties which are characteristic of this invention.

15 In a further aspect of the present invention, a process for producing a shampoo composition as hereinbefore described includes adding a basic solution, typically a solution of sodium hydroxide, to the short chain fatty acid dispersed in water. After mixing, this solution may be added to the APG with rapid mixing. Alternatively, a solution of the APG may be premixed with the short chain fatty acid at a temperature above the melting point of the acid, and subsequently neutralised with the solution of sodium hydroxide. When a viscosity agent is used, it may be added to an aqueous NaOH solution with vigorous mixing at high shear. After the viscosity agent has dispersed providing an evenly mixed solution free from lumps, liquid fatty acid may then be added.

20 Should the fatty acid be solid at ambient temperature it may be melted before addition to the basic solution. APG may then be added to the soap solution with rapid mixing.

An opacifier may also be employed in the process of the present invention, but this is not mandatory. Should an opacifier be included in the composition, it may be heated and mixed together with the APG to a temperature of the order of about 80°C. Suitable opacifiers include behenyl alcohol and castor wax. Once the opacifier melts and disperses in the APG, the mixture may be added to the basic solution with rapid mixing.

25 The invention will now be further illustrated with reference to the following examples. It is to be understood that the examples are not intended to limit the scope of the invention. All amounts are in % wt, unless otherwise stated.

30 Examples

Examples 1 to 6 (Table 1) illustrate compositions of the present invention in the form of shampoos for the hair. The compositions of Examples 7 to 14 (Table 2) are suitable for use as body shampoos/shower gels.

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TABLE 1

	<u>Ingredient</u>	<u>Example</u>					
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
10	Oramix NS10 ¹	12	-	13	12	15	13
	APG600 ²	-	12	-	-	-	-
	Caprylic acid	4	5	-	-	-	-
	Capric acid	-	-	4	5	-	-
15	Coconut fatty acid	-	-	-	-	3	4
	Nacol 22-97 ³	-	-	-	-	-	0.5
	Castorwax	-	-	0.4	0.4	-	-
20	Sucrose laurate	-	-	-	-	1	-
	Rilanit GMRO ⁴	-	-	0.4	-	0.4	-
	Montanol 68 ⁵	-	-	-	1.00	-	2.0
	Beeswax	-	-	-	-	0.4	-
25	Klucel M ⁶	0.8	-	-	-	-	-
	Trisodium citrate ⁷	1.0	1.0	1.0	1.0	1.0	1.0
	Sodium chloride	-	1.0	5.0	2.5	3.0	2.0
30	5% NaOH	-----to pH7-----				-to pH7.5-	
	Perfumes, preservatives	qs	qs	qs	qs	qs	qs
	colouring etc.						
	Water	-----to 100-----					
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- 1) C₁₀ alkyl glucoside, DP 1.3-1.4
- 2) C₁₂₋₁₄ alkyl glucoside, DP 1.4
- 3) Behenyl alcohol
- 4) Glycerol monoricinoleate
- 5) Glucoside wax
- 45 6) Hydroxypropyl cellulose
- 7) Buffering agent

TABLE 2

	<u>Ingredient</u>	<u>Example</u>							
		<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>
5	APG600	16	15	14	-	-	-	-	9.5
10	Oramix NS10	-	-	-	15	14	16	16	5.5
	Coconut fatty acid	4	5	6	5	6	4	4	5
	Clay - Laponite	1	1	4	1	1	1	-	1
	Bentone	-	-	-	-	-	-	2	-
15	Perfume, preservative colouring etc.	qs	qs	qs	qs	qs	qs	qs	qs
	NaOH	----- to pH8 -----							
20	Water	----- to 100 -----							

Comparative Examples 1 and 2

25 The following Comparative Tests 1 and 2 were performed between a control formulation containing no short chain soap, compositions A and B which contained short chain soaps and composition C which contained a long chain soap, as depicted in the following table:-

	<u>Ingredient</u>	<u>Control</u>	<u>Composition (wt%)</u>		
			<u>A</u>	<u>B</u>	<u>C</u>
30	Oramix NS10	18	16	16	16
	Caprylic acid	-	2.0	-	-
35	Capric acid	-	-	2.0	-
	Oleic acid	-	-	-	2.2
	5% NaOH solution	-----to pH7-----		to pH8	
40	Water	-----to 100-----			

Comparative Test 1 - Arm wash test

45 Panellists were asked to generate foam in an arm wash test wherein measured amounts of shampoo had been applied to their hands for lathering prior to rubbing the foam on the inside of the forearm. 12 panellists were used in paired comparison tests between two 6-membered groups. The first group used one product first while the second group used the other product first. The paired test was also balanced between the use of left and right forearms. The panellists were then asked to score each product for various descriptors by magnitude estimation.

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Results

	Control vs A	Control vs B	Control vs C
5 Ease of foaming	A	B	C
Amount of foam	A	B	C
Creaminess of foam	A	B	C

10 The product indicated in each case was preferred ($\geq 95\%$ significance). Thus, for the first three descriptors the product indicated had a higher score (easier foaming, more foam, creamier foam)

Conclusion - all three types of soap gave greatly improved lather quantity and quality, compared with the use of no soap at all in combination with the APG.

15 Comparative Test 2 - Test of dry hair properties

This is a paired comparison test in which 3 hair switches were washed with one product and 3 with the other product. 12 panellists were used. The switches were assessed in pairs and the panellists were asked to indicate which of the two switches they preferred (left or right) for various attributes.

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Results

	Control vs A	Control vs B	Control vs C
25 Gloss	n.s	n.s	control
Smoothness	n.s	n.s	control
Ease of comb	n.s	n.s	control
30 Lack of flyaway	A	n.s	control

The product indicated in each case was preferred ($\geq 95\%$ significance, n.s. - no significant difference).

35 Conclusion

A and B (caprylic and capric soaps, respectively) give superior dry hair properties as compared to C (oleic soap). A and B show no negatives on dry hair properties, whereas C does.

40 Comparative Example 3

This Example demonstrates the effect of carbon chain length of the short chain soap on lathering properties and product stability of a skin shampoo composition.

The following three shampoos D, E and F were prepared with the following compositions:

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Ingredient	Composition (wt%)		
	D	E	F
Oramix NS10	10	10	10
APG600	5	5	5
Capric (C_{10}) soap	5	-	-
Lauric (C_{12}) soap	-	5	-
Oleic (C_{18}) soap	-	-	5
Laponite	1	1	1
Perfume, preservative, etc	qs	qs	qs
NaOH	to pH8.5	to pH8.5	to pH8.5
Water	to 100	to 100	to 100

Each of the above shampoos was subjected to an arm wash test in which the foam volume and creaminess were measured. Each of 20 trained panellists wearing surgical gloves firstly wetted their hands and then dispensed thereon 0.5g of product which was then worked into a lather.

Lather volume and creaminess were measured using magnitude estimations at 4 second intervals, the results given below being normalised average figures for each product. The actual lather volume for each product was also measured quantitatively. The results are given in the table below.

	Composition		
	D	E	F
Foam volume	1.13	0.94	0.5
Foam creaminess	1.00	0.94	0.6
Measured foam volume (ml)	72	62	50

To test stability, each composition was allowed to stand for 3 months at 37°C. Shampoos D and E remained clear, whereas shampoo F showed precipitation of solid soap crystals, indicating that the product had destabilised.

Comparative Example 4

This Example demonstrates the effect of short chain soap: APG weight ratio (with a C_{12} soap) on lather properties and mildness of a skin shampoo composition.

The following three shampoos G, K and I were prepared with the following compositions:

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Ingredient	Composition (wt%)		
	G	H	I
5 Oramix NS10	12	10	10
10 APG600	4	5	3
C ₁₂ soap	4	5	6
Laponite	1	1	1
15 Perfume, preservation, etc	qs	qs	qs
NaOH	to pH8	to pH8	to pH8
Water	to 100	to 100	to 100

Each of the above shampoos was subjected to the following tests:

Test I - Arm-wash test

20 20 trained panellists conducted an arm-wash test by firstly pre-wetting the forearm and then dispensing directly into the hand 0.5g of the test product which was then lathered on the forearm for 10 seconds. The arm was rinsed under running water until fully rinsed and then pat-dried with a paper towel. During and after (after a 2 minute wait) the wash procedure each panellist was questioned as to whether they thought each 25 product tested satisfied the following criteria : product disperses easily; product lathers easily; product gives copious lather; product gives creamy lather. The results in the table below are expressed as a percentage of the panellists who thought each criterion was satisfied.

Results	Composition		
	G	H	I
Disperses easily	78.9	77.3	77.1
Lathers easily	64.0	70.4	73.2
Copious lather	60.4	69.5	66.2
Creamy lather	65.8	70.8	71.6

Test II - Zein test

40 Each composition was tested for mildness on the skin in accordance with the Zein test, the protocol of which is described for example in (i) E. Gott : Proceedings of the 4th International Congress of Surface Active Substances, Brussels 1964, volume 3, pages 83-90, or (ii) M. J. Schwinger : Kolloid - Z.Z. Poly., 1969, volume 233, page 898, the disclosures of both of which references are incorporated herein by reference.

45 The following results were obtained, the lower the Zein value indicating a milder product:

Composition	Zein value (%N)
G	0.04
H	0.06
I	0.14

Claims

1. A liquid, aqueous shampoo composition suitable for application to skin or hair, comprising:
 - (a) as a principal surfactant component, at least one alkyl polyglycoside; and
 - (b) at least one short chain fatty acid soap having a carbon chain length of up to C₁₆.
- 5 2. A shampoo composition according to claim 1, wherein the alkyl polyglycoside has the formula:

$$R_o - (G)_n$$
 wherein R is a branched or straight chain alkyl group G is a saccharide group, and n is the degree of polymerisation.
- 10 3. A shampoo composition according to claim 2, wherein R has a mean alkyl chain length of from C₅ to C₂₀.
4. A shampoo composition according to claim 2 or claim 3, wherein n lies in the range 1 to 10.
- 15 5. A shampoo composition according to claim 4, wherein the value of n is up to 1.5.
6. A shampoo composition according to any one of claims 2 to 5, wherein G is selected from C₆ or C₆ mono-saccharide residues or mixtures of C₅ and C₆ monosaccharide residues.
- 20 7. A shampoo composition according to any preceding claim, wherein the APG is present in an amount of from 1 to 40% by weight.
8. A shampoo composition according to any preceding claim, wherein the short chain soap length is from C₈ to C₁₄.
- 25 9. A shampoo composition according to claim 8, wherein the short chain soap length is from C₈ to C₁₂.
10. A shampoo composition according to claim 8, wherein the short chain soap is selected from soaps of caprylic, capric, myristic and lauric acids and mixtures thereof.
- 30 11. A shampoo composition according to any preceding claim, wherein the short chain soap is present in an amount of from 1 to 20% by weight.
12. A shampoo composition according to any preceding claim, wherein the weight ratio of short chain fatty acid soap to APG is less than 1:1.
- 35 13. A shampoo composition according to claim 12, wherein the weight ratio of short chain soap to APG is from 1:2 to 1:20.
14. A shampoo composition according to any preceding claim, further comprising one or more additional components selected from surfactant, conditioning agents, buffering agent, opacifier, thickening agent, cationic conditioning polymer and wax.
- 40 15. A shampoo composition according to any preceding claim, which is a hair shampoo.
16. A shampoo composition according to any preceding claim, which is a body shampoo or shower gel.
- 45 17. A method of washing hair or skin, comprising applying thereto a shampoo composition according to any preceding claim.



**European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 30 0837

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	EP-A-0 409 005 (KAO CORPORATION) 23 January 1991 * page 3, line 10 - line 13 * * page 6 - page 7; example 4 * * claim 1 *	1-11,14, 16,17 12,13,15	A61K7/08
Y	EP-A-0 070 077 (THE PROCTER & GAMBLE COMPANY) 19 January 1983 * page 4, line 9 - line 12 * * page 6, line 31 - page 6A, line 23 * * page 14, line 18 - line 23 * * page 17; example 3 *	12,13	
Y	EP-A-0 358 216 (KAO CORPORATION) 14 March 1990 * page 9; examples 2,3 *	15	
-----			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A61K
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	29 APRIL 1993	BOULOIS D.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone	T : theory or principle underlying the invention		
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